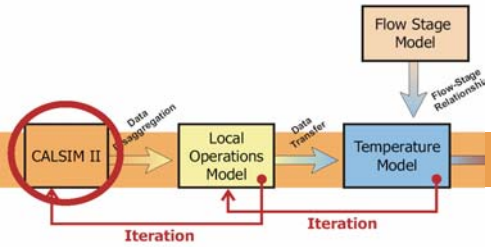
OROVILLE FACILITIES RELICENSING



CALSIM II

Water Resources Simulation Model for SWP / CVP Operations

Historical Operations Study

Objective of Study

CalSim II is central to SWP and CVP planning and management, and many other federal, state, regional and local water related planning activities. The model is either currently being used or will be used to support analysis for the California Water Plan Update, CALFED's Integrated Storage Investigations and Conveyance Programs, development of the CVP Operating Criteria and Plan (OCAP) and the FERC relicensing of Oroville. Given the wide scope and important nature of these planning activities, accurate estimates of future water supply are crucial. However model estimates of future project export capability from the Delta have proved controversial. The purpose of the Historical Operation Study is to evaluate the performance of CalSim II through the simulation of recent historical conditions. The *Historical Operation Study* is part of a larger CalSim II evaluation process. Other components of the evaluation include:

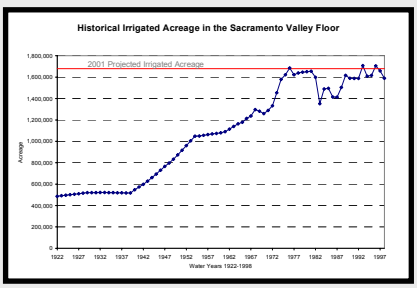
- a survey of stakeholders of their concerns and opinions of the model
- a model peer review by leading academics and practitioners,
- and a sensitivity analysis on model inputs and parameters.

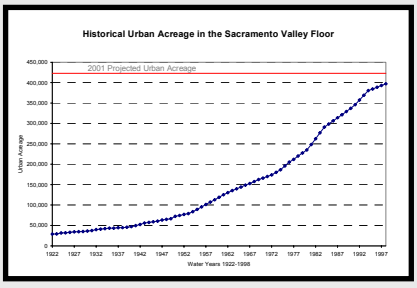
It is hoped that this effort, to assess the quality and limitations of CalSim II, will lead to a wider debate about critical model issues, help direct model development in both the near and long term, and eventually lead to greater public confidence and acceptance of the model.

Study Description

The period of simulation for the Historical Operations Study is water years 1975 to 1998. This 24-year period includes the 1976-77 and 1987-92 droughts, as well as the driest (1977) and the wettest (1983) years on record. Input to the current CalSim II model has been changed to reflect the historical changing conditions rather than a fixed level of development as is normally the case for studies. The Historical Operations Study is limited in geographical scope to a dynamic operation of the Sacramento Valley, the Delta, and the CVP-SWP facilities south of the Delta. The study is derived from the Benchmark Study released on September 30, 2002, available at http://modeling.water.ca.gov. Changes to the Benchmark Study have been kept to a minimum so as to maintain the essence of the CalSim II model used for estimate of projected water supply reliability at a specific level of development.

Historical Land Use





Regulatory Baseline

Simulation of historical conditions rather than a fixed level of development requires accounting for the changing regulatory baseline to which project operations must adhere. For the Historical Operations Study the historical regulations have been simplified into three periods.

- October 1974 – September 1992: represented by D-1485,
- October 1992 – September 1994: represented by D-1485 and 1993 winter-run biological opinion (minimum carryover storage in Lake Shasta, and temperature related minimum instream flows at Keswick),
- October 1994 – September 1998: represented by D-1641 and 1993 winter-run biological opinion

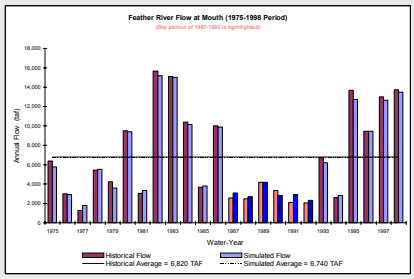
While this does not fully account for all the changes in project and system-wide operational criteria, especially export curtailments due to fish entrainment, it is considered a reasonable approximation for the current analysis.

SWP Demands

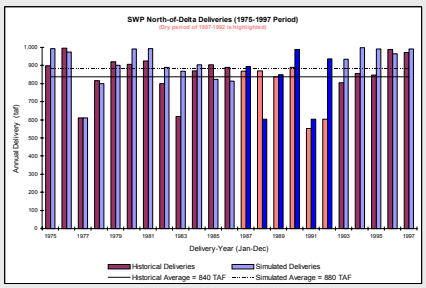
SWP long-term contractors submit their initial requests for Table A contractual entitlement deliveries to DWR in December before the start of the contract year. These initial requests are made with no knowledge of the coming water year hydrologic conditions and therefore tend to be conservative. In wet years contractors typically revise requests downward depending on local wetness conditions and the availability of local supplies. The historical initial request data are available from SWPAO; contractors' final requests are not.

In the Historical Operations Study the historical deliveries were used as SWP south-of-Delta contractors' demands in wet and above-normal years, when there was usually sufficient water available for making deliveries and the operation of the system was driven by contractors' demands. In the below-normal, dry and critical years, when the operation was supply limited, the annual demands were set at the contractors' requests.

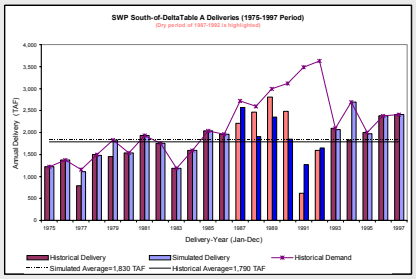
Study Results: Feather River Flows

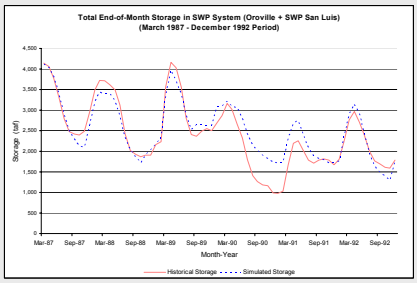


Study Results: SWP North-of-Delta Deliveries - FRSA



Study Results: SOD Deliveries and Storage Operations





SWP South-of-Delta Deliveries

In order to make the simulated and historical deliveries more comparable, the effect of storage utilization in the dry period was taken into account in the simulated values of "adjusted" deliveries. This was done by adding to or subtracting from the simulated annual deliveries, the annual change in storage used to make those deliveries in each year of the dry period. If more storage was used in making the historical delivery, the additional storage was added to the simulated delivery, and if there were less storage utilization in the historical case, the simulated values were reduced by that storage difference.

Study Results: SWP South-of-Delta Adjusted Deliveries 1987-93